

Two new cave Prosobranch snails from Papua New Guinea: *Selmistomia beroni* n.gen. n.sp. (Caenogastropoda: Hydrobiidae) and *Georissa papuana* n.sp. (Archaeogastropoda: Hydrocenidae). (Zoological results of the British Speleological Expedition to Papua New Guinea 1975.)

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Two new cave Prosobranch snails from Papua New Guinea: *Selmistomia beroni* n.gen. n.sp. (Caenogastropoda: Hydrobiidae) and *Georissa papuana* n.sp. (Archaeogastropoda: Hydrocenidae). - (Zoological results of the British Speleological Expedition to Papua New Guinea 1975.) Conchyliological and anatomical data of two new snails found in caves of Western province of Papua New Guinea are given. *Selmistomia beroni* n.gen.n.sp. is described from Selminum Tem cave, *Georissa papuana* n.sp. is described from Big Cave.

Key-words: Hydrobiidae - Hydrocenidae - Papua New Guinea - New taxa.

INTRODUCTION

A British speleological expedition spent 5 months in 1975 exploring an area of 25'000 sq.km. of limestone terrain of Finim Tel Plateau in the Central Highlands, Papua New Guinea, and culminated in the discovery and exploration of the 20 km long Selminum Tem cave. The cave fauna collected by P. Beron and P. Chapman included a number of troglomorphic and endemic new species (CHAPMAN 1985) which have been described between 1977 and 1992. The Molluscs collected in two caves and entrusted to me in August 1993 by P. Beron are listed in this paper and two new taxa are described.

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SPECIES ACCOUNT

Selminum Tem Cave, Western Province PNG.

- Prosobranchia Hydrobiidae Tateinae : *Selmistomia beroni* n.gen. n.sp.
Approx. 40 specimens of a new species living in water. See description below.
- Pulmonata Planorbidae : *Segmentina* sp.
One non adult specimen; indetermined.

Big Cave, Western Province PNG.

- Prosobranchia Hydrocenidae: *Georissa papuana* n.sp.
Approx. 40 specimens of a new species living on wet rock. See description below.
- Prosobranchia Hydrobiidae Tateinae : *Fluviopupa* sp. or *Selmistomia* sp.
Two specimens, only empty shells; not determinable.

DESCRIPTIONS

Selmistomia n.gen.

DIAGNOSIS: Member of the subfamily Tateinae; *Hemistomia* - like pupoid - ovate shell. Operculum with a non - calcareous , non - digitate peg, the peg is bent over about 90° toward the external edge of the operculum; the peg is concentrically striated. Penis bearing in the middle part a crest - like lobe. Radula central teeth with 2 pairs of basal cusps.

TYPE SPECIES: *Selmistomia beroni* n.sp.

Derivatio nominis: Selminum Tem Cave, Western Province PNG.

Selmistomia is closely related to *Hemistomia* Crosse 1872, *Fluviopupa* Pilsbry 1911 and *Fluvidona* Iredale 1937 (= *Hemistomia* sensu PONDER 1982).

For discussion on systematics: See PONDER & WAREN 1988, and KABAT & HERSHLER 1993.

DIFFERENTIAL DIAGNOSIS:

Other similar genera of the "*Hemistomia* radiation" sensu PONDER 1991 differ from *Selmistomia* as follows:

(a) genera with 1-2 pairs of basal cusps on the central teeth of the radula (no difference with *Selmistomia*):

- *Hemistomia* Crosse 1872: possesses an orange operculum with a 2-4 digitate straight peg and white smear, without concentric striae (FRANC 1956, SOLEM 1961); the soft part anatomy is astonishingly not yet known; possibly a monotypic endemic New Caledonian genus (PONDER 1991, PONDER 1992).

- *Jardinella* Iredale & Whitley 1938: possesses an operculum with or without a white smear, no peg; an elongated osphradium; a simple penis with or without swollen areas; a pallial vas deferens with loops or coils. (PONDER & CLARK 1990).
- *Fonscochlea* Ponder, Hershler & Jenkins 1989: possesses an operculum with small white smear; and /or with a 2-5 digitate peg; a simple, evenly tapering penis, without lobe or bulb; a renal oviduct with two equal - sized sperm sacs. (PONDER et al.1989).

(b) genera with 3-5 pairs of basal cusps on the central teeth of the radula:

- *Fluvidona* Iredale 1937 (= *Hemistomia* sensu PONDER 1982): possesses an operculum with a white smear and a mostly 2-5 digitate, straight peg; a simple, evenly tapering penis, without lobe or bulb (PONDER 1982).
- *Fluviopupa* Pilsbry 1911: possesses a thin horny paucispiral operculum with white smear, but no pegs; a distally lobed penis, some species with a median bulb; a straight intestine on pallial roof (PONDER 1982, STARMÜHLNER 1970, SOLEM 1959, HUBENDICK 1952, ANCEY 1905).
- *Potamopyrgus* Stimpson 1865: possesses an operculum with or without white smear, no peg; a simple, tapering penis, without lobe; the females are sometimes ovoviviparous; sometimes parthenogenic reproduction (PONDER 1982, PONDER & CLARK 1990).
- *Tatea* Tenison-Woods 1879 possesses an operculum with a 2-10 digitate peg; a simple penis without lobe; in the females a genital opening located beneath the middle of the capsule gland; a partially spirally sculptured shell with two protoconchs (PONDER et al. 1991).

Selmistomia beroni n.sp.

MATERIAL:

Holotype: Museum of Natural History of Geneva, Switzerland, N° MHNG 994.104

L= 2.92 mm; Dmax. 1.69 mm; Ratio L/Dmax = 1.73; 4 1/2 whorls, Aperture 0.94 x 0.81 mm.

Paratypes: Museum of Natural History of Geneva, Switzerland N° MHNG 994.105 (7); National Museum of Natural History, Sofia, Bulgaria (7); my collection.

Type locality: freshwater stream in the cave Selminum Tem, Finim Tel Plateau, near Telefomin, Central Highlands, Hindenburg Range, Western Province, Papua New Guinea. Selminum Tem cave system develops 20,5 km of passages at an altitude of 2400 m a.s.l. Air temperature in the cave was 13°C; Aug. 1975, P. Beron and P. Chapman

SHELL (fig.1): the shell is minute pupoid - ovate, with 4 to 4,5 rounded whorls, both protoconch and teloconch are smooth. Without columellar fold, without umbilicus. Aperture ovate separated from parietal wall by a narrow groove, peristome continuous and little thickened.

Dimensions of the type series (holotype + 26 paratypes ; n=27):

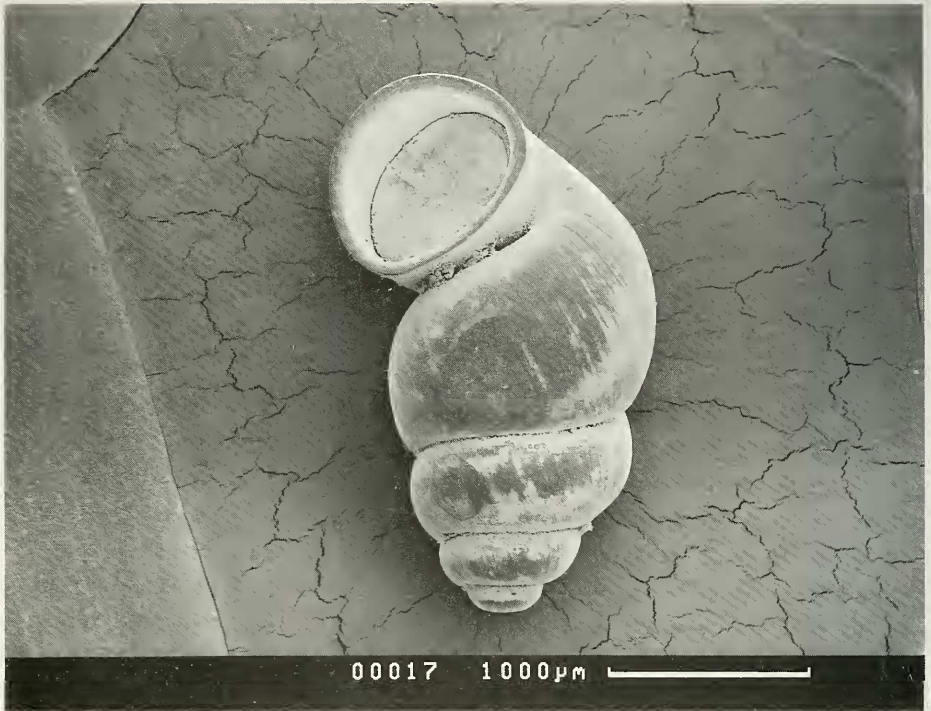


FIG. 1

Selmistomia beroni: shell.

length L: 2.47 mm ; standard deviation SD 0.23 mm
 min. 2.08 mm ; max. 2.92 mm

diameter max. (shell width) Dmax.: 1.44 mm ; SD 0.13 mm;
 min: 1.23 mm; max. 1.72 mm

diameter of last whorl D1: 1.21 mm ; SD 0.10 mm
 min. 1.01 mm; max. 1.46 mm

Ratio L/Dmax.: 1.72 ; SD 0.08
 min. 1.55 ; max. 1.90

Ratio L/D1.: 2.04 ; SD 0.13
 min. 1.74 ; max. 2.28

HEAD-FOOT: Without pigment. Cephalic tentacles with eye spots at their basis. Operculum (fig.2): subovate (770 - 815 x 540 - 520 μ m) with a peg (140 -200 μ m in height), its edge is sinuous but not subdivided in fingers, the peg is bent over about 90° toward the external edge of the operculum. No white smear.

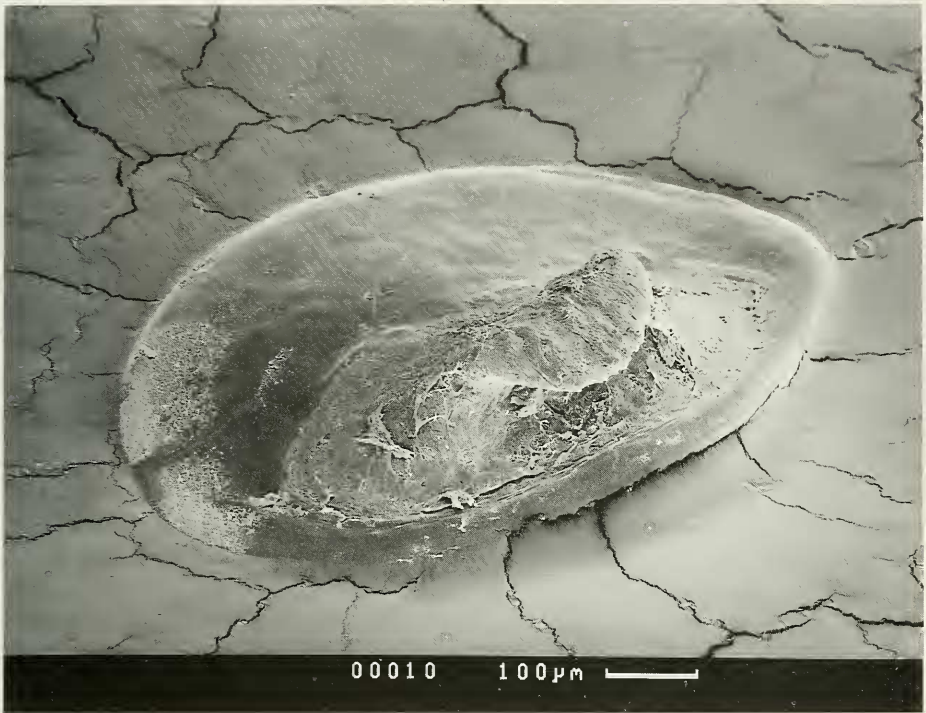


FIG. 2

Selmistomia beroni: operculum.

Radula (fig. 3): taenioglossate typically amnicolid with the formula $5+1+5/2+2$; $4+1+5$; 24; 22. The marginal and lateral teeth are about $45\ \mu\text{m}$ long, the central tooth is trapezoidal $20\ \mu\text{m}$ large. The radula size is about $500 \times 60\ \mu\text{m}$.

MANTLE CAVITY (fig. 4): mantle edge without papilla. Ctenidium with 7-10 gills. Osphradium short, oval ($200 \times 90\ \mu\text{m}$).

DIGESTIVE SYSTEM: Stomach with style sac; no coecal appendage. Intestine makes a pallial S-shaped double loop on pallial roof, and contains ovate faecal pellets.

FEMALE REPRODUCTIVE SYSTEM (fig.4): Capsule gland composed of two parts. Renal oviduct thickens and makes a double loop, insert one small Seminal Receptacle ($100 \times 105\ \mu\text{m}$) and enters the ventral channel. An elongate Bursa copulatrix ($520 \times 250\ \mu\text{m}$) is connected with a short duct with central insertion to the ventral channel at the inferior end of albumen gland. Ducts of Bursa copulatrix and Seminal Receptacle became distended before their insertion to the ventral channel. The ventral channel opens at the end of capsule gland. No gonopericardial duct detected.

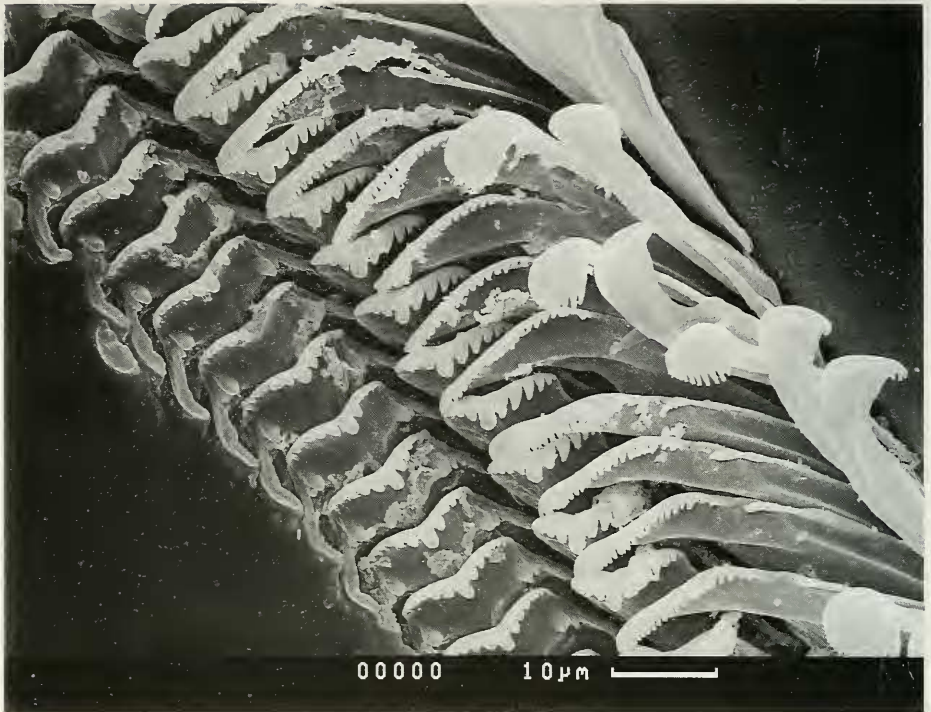


FIG. 3

Selmistomia beroni: radula.

MALE REPRODUCTIVE SYSTEM (fig.4): Penis conical about 1000 μm long, expanded base, tapering to slender distal end; a crest-like lobe (90 x 55 μm) at its middle part. Prostate bean-shaped (700 x 270 μm). Pallial vas deferens straight or undulating, no loops.

ETHYMOLOGY: named after Dr. Petar Beron, director of the National Museum of Natural History, Sofia, who entrusted the specimens to me.

From Papua New Guinea only few taxa of possible Hydrobiidae were known previously:

"Hemistomia" pygmaea Van Benthem Jutting 1963, known only by the shell; the 2.5 mm long shell has a thick calcareous rib along the exterior margin of the peristome.

"Tatea" pyramidata Van Benthem Jutting 1963, known only by the shell; after PONDER et al. 1991 this species being probably a member of Pomatiopsidae.

"Fluviopupa" novoguineensis Van Benthem Jutting 1963, was described from West Irian (PNG) only on shell characters; after PONDER 1982 this species is not a *Fluviopupa* but is identical with *"Tatea" pyramidata*.

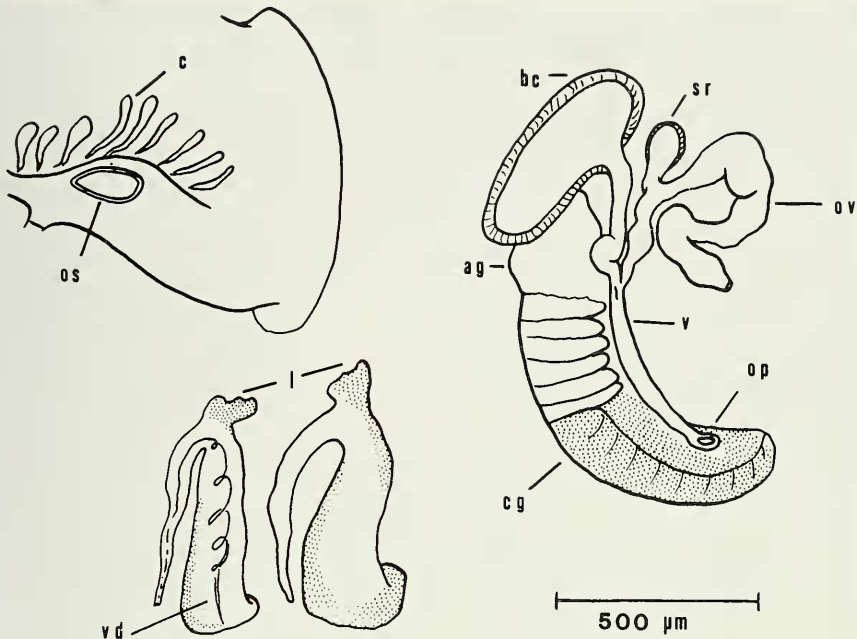


FIG. 4

Selmistomia beroni: mantle cavity: c - ctenidial filaments; os - osphradium; male reproductive system (penis): l - penial lobe; vd - vas deferens; female reproductive system (oviduct complex): ag - albumen gland; b - bursa copulatrix; cg - capsule gland; ov - oviduct; op - oviduct opening; sr - seminal receptacle; v - ventral channel.

Two specimens of *Fluviopupa* - like hydrobiids from the Sepik River are known from empty shell only (PONDER 1982).

Previous works (RIECH 1937) on molluscs of Papuasias and Melanesia do not mention any representative of Hydrobiidae.

None of the above cited genera or species can be identified with the specimens from Selminum Tem Cave.

Selmistomia beroni is therefore the first unequivocal representative of Hydrobiidae known on the island of New Guinea.

***Georissa papuana* n.sp.**

MATERIAL:

Holotype: Museum of Natural History of Geneva, Switzerland, N° MHNG 994.102.

L= 1.73 mm; Dmax. 1.52 mm; Ratio L/Dmax = 1.14; 3 1/4 whorls. Aperture 0.75 x 0.75 mm.

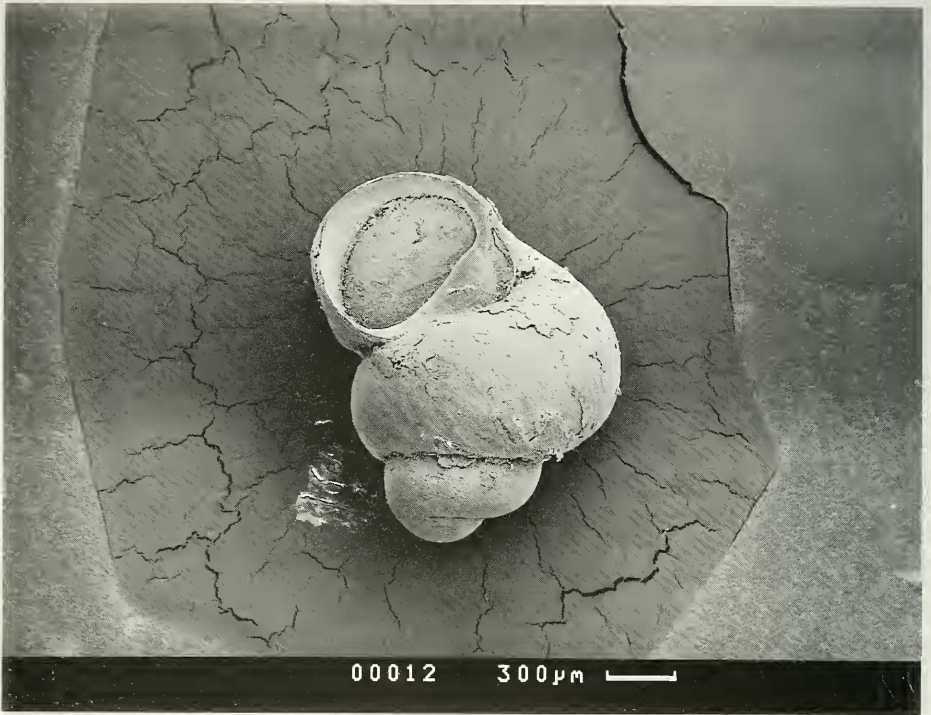


FIG. 5

Georissa papuana: shell.

Paratypes: Museum of Natural History of Geneva, Switzerland (N° MHNG 994.103) (6); National Museum of Natural History, Sofia, Bulgaria (6); my collection.

Type locality: Big Cave, Mount Fugilil, Finim Tel Plateau, Central highlands, Western Province, Papua New Guinea. Big Cave opens at an altitude of 3100 m a.s.l. Air temperature in the cave was 9°C; Aug. 1975. P. Beron and P. Chapman, .

SHELL (fig.5): Shell minute broadly conical. with 3.5 to 4 rounded whorls. Apex rounded with a large cap - shaped spherical smooth protoconch. Teloconch smooth, in juvenile and transparent specimens there are weakly developed longitudinal brown ribs between growth striations crossing hardly detectable, very weak spiral threads. Without umbilicus, umbilical area closed with a wide shield (or callus). Columellar callus wide and rounded. Aperture subovate, peristome thin.

Dimensions of the type series (holotype + 24 paratypes; n=25) :

length L: 1.69 mm ; standard deviation SD 0.08 mm

min. 1.56 mm ; max. 1.85 mm

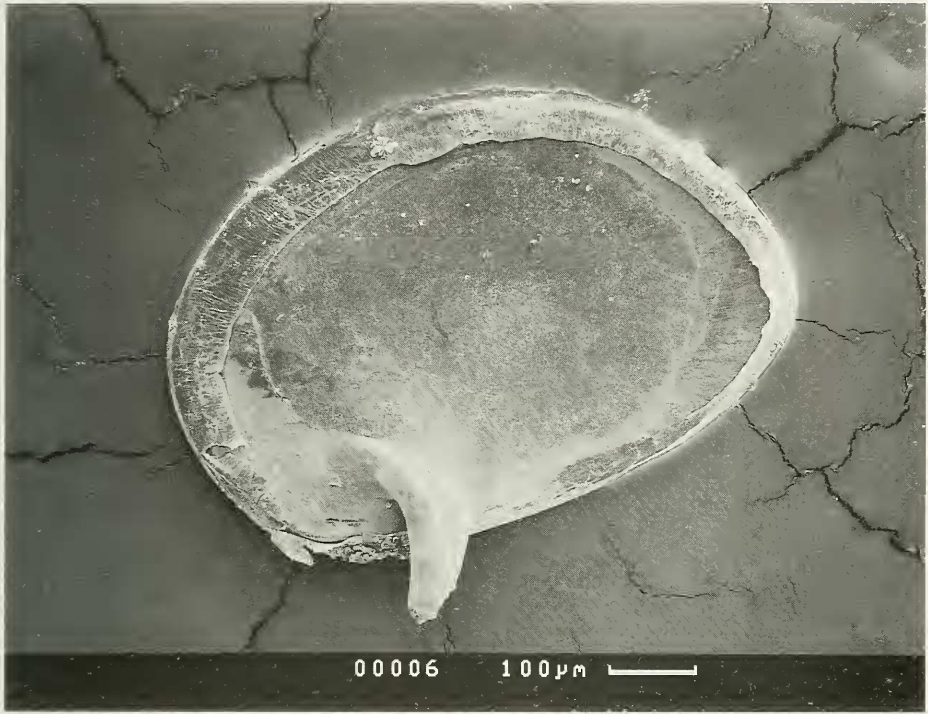


FIG. 6

Georissa papuana: operculum.

diameter max. (shell width) Dmax.: 1.40mm ; SD 0.05 mm;

min: 1.30 mm; max. 1.46 mm

diameter of last whorl D1: 1.21 mm ; SD 0.06 mm

min. 1.10 mm; max. 1.33 mm

Ratio L/Dmax.: 1.21 ; SD 0.04

min. 1.09 ; max. 1.27

Ratio L/D1.: 1.40 ; SD 0.07

min. 1.32 ; max. 1.54

HEAD-FOOT: Snout short and broad, almost unpigmented. No cephalic tentacles; the large eyes are sessile at the basis of short cephalic lobes.

Operculum (fig.6): subovate (approx. 700 x 480 μ m) formed by an outer horny plate with concentric striations and an inner calcareous plate, smooth, bearing an acentric stocky peg (apophysis) (approx. 240 μ m in height) close to the columellar edge of the operculum; the peg is slightly bent and projects outwards, its dorsal side has a longitudinal groove. The inside edge of the operculum bears a narrow circular callus.



FIG. 7

Georissa papuana: radula.

The operculum is retractable within the mouth of the shell, its upper edge retracts within the shell for about a quarter whorl.

Radula (fig.7): rhipidoglossate. Very long radular sac ($1100 \times 60 \mu\text{m}$ to $2200 \mu\text{m} \times 100 \mu\text{m}$); the about 1000 mm long radula consists of approx. 14 cords of very numerous marginal teeth approx. $27 \mu\text{m}$ long; the edge of these marginal teeth bears about 10 long cusps alternating with about 8 short cusps. Central and lateral teeth missing.

MANTLE CAVITY: mantle edge without papilla. No gills; no osphradium. Mantle wall vascularized.

DIGESTIVE SYSTEM (fig.8): No jaw. Oesophagus (diameter approx. $50 \mu\text{m}$) from radular sac to stomach. Stomach (approx. $425 \times 275 \mu\text{m}$) with style sac (approx. $345 \times 205 \mu\text{m}$); no coecal appendage. Intestine (diameter $95 \mu\text{m}$) makes a double loop around the style sac, and moves straight to its opening in the pallial cavity (pallial rectum); the intestine contains a few ovate faecal pellets in the vicinity of the stomach and a pulpy brown faecal mass in the pallial rectum. Subsequently to the stomach a large sized, brown orange coloured digestive gland.

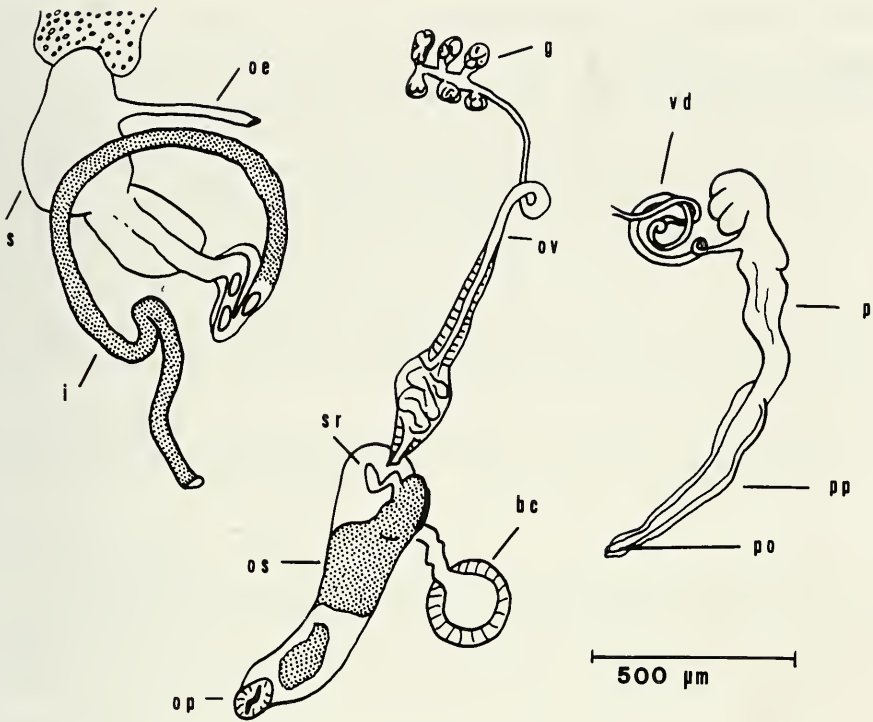


FIG. 8

Georissa papuana: digestive system: i - intestine; oe - oesophagus; s - stomach; female reproductive system (oviduct complex): bc - bursa copulatrix; g - gonad; os - oviduct sac; op - oviduct opening; ov - oviduct; sr - seminal receptacle (?); male reproductive system (prostate complex): p - prostate I; pp - prostate II; po - prostate opening; vd - vas deferens.

FEMALE REPRODUCTIVE SYSTEM (fig.8): a pallial oviduct sac (approx. $700 \times 200 \mu\text{m}$) (uterus ?, nidamental gland ?) opens near the opening of the intestine. The renal oviduct becomes a glandular wall and thickens before its opening into the upper section of the uterus. A spherical Bursa copulatrix (approx. $200 \times 170 \mu\text{m}$) inserts through a bursal duct in the upper part of the uterus. On the opposite side a little tubular lobe (approx. $120 \times 35 \mu\text{m}$) (seminal receptacle ?) enters also the uterus. The upper part of the uterus wall is thickened and glandular; the lumens occupy a little more than $3/5$ of the upper, posterior part and $1/5$ of the lower, anterior part.

MALE REPRODUCTIVE SYSTEM (fig.8): No copulatory organ. The very elongated prostate (approx. $1000 \mu\text{m}$ long) lies along the pallial intestine portion (pallial rectum), it opens near the opening of the intestine; the prostate is formed by a long glandular section (approx. $900 \times 100 \mu\text{m}$) (spermatophore organ ? prostate II ? anterior prostate ?) and a short glandular section (approx. $380 \times 170 \mu\text{m}$) around the opening of the vas deferens (cytaphore organ ? prostate I ? posterior prostate ?). The vas deferens makes a lot of coils before the testes.

ETHYMOLOGY: named after Papua country.

DIFFERENTIAL DIAGNOSIS:

Georissa papuana differs from other similar Hydrocenid species as follows:

- from all *Georissa* species described from the Pacific and Asiatic areas having sculptured conch (spiral threads, spiral nodes); for instance *G. sarrita* Benson (BLANFORD 1869); *G. javana* Moellendorf 1897 (VAN BENTHEM JUTTING 1948); *G. zea* (THOMPSON & ILIFFE 1987); *G.* (= *Omphalorissa* Iredale 1933) *multilirata* Brazier 1875, *G. minuta* Odhner 1917, *G. postulata* Iredale 1937, *G. laseroni* Iredale 1937 and *G. obesa* (SOLEM 1988); *G. williamsi*, *G. hosei*, both Dowin-Auten 1889; *G. similis*, *G. gomantonensis*, both Smith 1893; *G. borneensis*, *G. everetti*, both Smith 1895; *G. kobelti* Gredler 1902; *G. hadra*, *G. pyrroderma*, *G. xesta* (THOMPSON & DANCE 1984).
Other species described as *Hydrocena* are indeed sculptured *Georissa*, e.g. *H. reticulata* (VAN BENTHEM JUTTING 1957); *H. quadricarinata* (VAN BENTHEM JUTTING 1963); *H. scalinella* and *H. saulae* (VAN BENTHEM JUTTING 1966).
- only few *Georissa* species with obliterated sculpture have been described: *Realia* (= *Georissa*) *isseliana* (Tapparone-Canefri 1883) (SOLEM 1988); *G. laeviuscula* Moellendorf 1897 and *G. obsoleta* (THOMPSON & HUCK 1985).
G. isseliana from Aru Island, Papua New Guinea, differs from *G. beroni* in having a subacute apex and a conical shell (operculum unknown); *G. laeviuscula* from Java lacks an umbilical shield; *G. obsoleta* from the New Hebrides possesses a more conical shell and weak denticles above shoulder along the second and third whorls.
- *Lapidaria chinensis* (Kang 1986) from China differs in radula, intestine and shell characters.
- *Georissops* Pilsbry & Hirase 1908 from China differs by a non-retractable operculum within the mouth of the shell.
- *Chondrella* Pease 1871 from Society Island differs by a heavy callused ridge around the inside margin of the operculum.
- *Hydrocena* L.Pfeiffer 1847 from Europe differs by a conical smooth shell, by the operculum apophysis and some anatomical characters (BLANFORD 1869) (THIELE 1910).

From Papua New Guinea only one species, *Georissa isseliana* (Tapparone-Canefri 1883), was known till now; and from West New Guinea only two species: *Hydrocena reticulata* Van Benthem Jutting 1958 and *H. quadricarinata* Van Benthem Jutting 1963.

None of the above cited taxa can be identified with the specimens from Big Cave. The finding of a *Georissa* in a cave is not inhabitual, as the species of this genus live on limestone or in association with calcareous terrain (THOMPSON & DANCE 1984), often on the soil of damp forest (VAN BENTHEM JUTTING 1948) or in caves (SAUL 1966).

Three species were described from caves in Borneo: *Hydrocena scalinella* and *H. saulae* in Sabah province, *Georissa pyrrhoderma* in Sarawak province.

No less inhabitual is the finding of *Georissa* species at high altitudes: *Hydrocena javana* and *H. laeviuscula* were found at Mt. Gedeh, Java, at 3000 m.a.s.l. (VAN BENTHEM JUTTING 1948).

Astonishingly all the recent Hydrocenid species were described only on shell characteristics; no soft part anatomy has been described, except those for *Georissa sarrita* Benson by BLANFORD 1869 and for *Hydrocena cattaroensis* Pfeiffer 1841 by THIELE 1910.

An anatomical comparison with other Hydrocenid genera of which no anatomical data are known is not possible. Therefore the Hydrocenid of Big Cave is tentatively assigned to the genus *Georissa*, accordingly SOLEM 1988 stating that "the name *Georissa* is used for all Pacific taxa".

In a recent revision of proserpinoid snails, THOMPSON 1980 suggested for the Hydrocenidae the new superfamily Hydrocenacea TROSCHEL 1856 within the Neritimorpha.

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